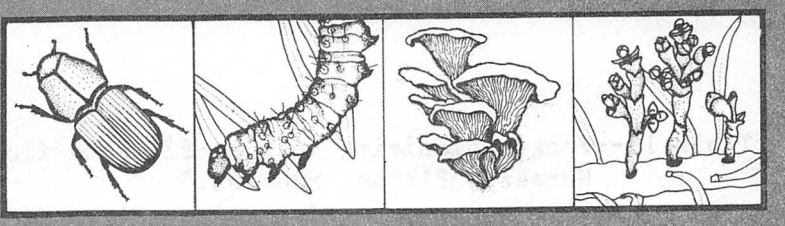
Forest Pest Management



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FUNGI COLONIZING DOUGLAS-FIR SEED AT THE CHAMPION TIMBERLANDS NURSERY, PLAINS, MONTANA

by

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Seedborne pathogens may cause important losses to conifer seedlings in nurseries, particularly if infected seeds are sown in containers or recently fumigated seedbeds. Several fungi are capable of colonizing conifer seed and attacking emerging germlings. Probably the most well known and damaging seedborne pathogens are those in the genus Fusarium (James 1983; Sutherland and Van Eerden 1980). These fungi may either be saprophytic or parasitic on seed or young seedlings.

Growers at the Champion Timberlands Nursery, Plains, Montana, were concenred about relative rates of Fusarium contamination on Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco) seed because of recurring problems with early seedling losses. Therefore, tests were conducted to provide information on contamination rates.

METHODS

Four lots of stratified Douglas-fir seed were received from the nursery. One hundred randomly selected seed from each lot were aseptically placed on a selective agar medium for Fusarium (Komada 1975). Seeds were incubated under cool, fluorescent light at 22°C for 7 days and examined for fungal colonization.

Fungal genera were identified using a standard taxonomic guide (Barnett and Hunter 1972). Individual species of Fusarium and Penicillium were grown on potato dextrose agar and identified using generic monographs (Booth 1971; Gerlach and Nirenberg 1982; Raper and Thom 1949).

RESULTS AND DISCUSSION

Fungi colonizing sampled Douglas-fir seedlots are listed in Table 1. Penicillium italicum Weh. was the most common fungal contaminant. Although this "blue mold" species may cause damage to citrus fruit, its effects on conifer seed are unknown.

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Table 1.--Fungi colonizing Douglas-fir seed from the Champion Timberlands Nursery, Plains, Montana.[1]

Fungus	Seedlot[2] A	B	C	D	All lots
Fusarium oxysporum	0	10	12	13	8.8
Fusarium solani	1	0	0	0	0.3
Trichoderma viride	3	27	10	41	20.2
Penicillium italicum	100	93	93	94	95.0
Penicillium chrysogenum	1	0	0	0	0.3
Rhizopus sp.	0	16	1	5	5.5
Mucor sp.	1	0	0	0	0.3

[1]Figures in table are percent of sampled seed colonized by the particular fungus.

[2]Seedlots A = 80/3-12-14
B = 80/20-13-13
C = 80/29-10-17
D = 80/17-11-10

Common saprophytic fungi colonizing Douglas-fir seed included *Trichoderma viride* Pers., *Penicillium chrysogenum* Thom, *Rhizopus* sp., and *Mucor* sp.

Two species of *Fusarium* were isolated from sampled seed (Table 1). The most prevalent was *F. oxysporum* Schlecht.; the other species, *F. solani* (Mort.) Sacc., was found on only one seed. Both species are common colonizers of conifer seed (James 1983; James and Genz 1981; James and Genz 1982). Seedborne *Fusarium* may cause seedling damping-off or disease after seedlings are several months old (James 1983; Sutherland and Van Eerden 1980). As a seed contaminant, *Fusarium* initially exists externally on the seedcoat as a saprophyte, but may later invade the seed (Neergaard 1977).

Frequency of contamination by *F. oxysporum* was slightly higher than previous assays of Douglas-fir (James and Genz 1982) seed. Levels of contamination may be related to seed sources (squirrel caches or live trees) or seed handling practices. Running water rinses for at least 48 hours should remove most *Fusarium* contaminating seedcoat surfaces. However, if significant contamination persists, chemical treatments with hydrogen peroxide or sodium hypochlorite (bleach) may be warranted.

LITERATURE CITED

Barnett, H. L. and B. B. Hunter.
1972. Illustrated genera of imperfect fungi. Burgess Publ. Co., Minneapolis. 241 p.

Booth, C.
1971. The genus Fusarium. Commonwealth Mycological Institue, Kew, Surrey, England. 237 p.

Gerlach, W. and H. Nirenberg.
1982. The genus Fusarium - a pictorial atlas. Paul Parey, Berlin. 406 p.

James, R. L.
1983. Fusarium root disease of containerized seedlings at the Montana State Nursery, Missoula. USDA Forest Service, Northern Region. 9 p.

James, R. L. and D. Genz.
1981. Ponderosa pine seed treatments: effects on seed germination and disease incidence. USDA Forest Service, Northern Region. Rept. 81-16. 13 p.

James, R. L. and D. Genz.
1982. Evaluation of fungal populations on ponderosa pine seed. USDA Forest Service, Northern Region. Rept. 82-22. 21 p.

Komada, H.
1975. Development of a selective medium for quantitative isolation of Fusarium oxysporum from natural soil. Rev. Plant Protec. Res. 8: 114-125.

Neergaard, P.
1977. Seed pathology. John Wiley & Sons, New York. 1187 p.

Raper, K. B. and C. Thom.
1949. A manual of the Penicillia. Williams & Wilkins Co., Baltimore. 534 p.

Sutherland, J. R. and E. Van Eerden.
1980. Diseases and insect pests in British Columbia forest nurseries. Brit. Columbia Min. of Forests, Can. For. Ser., Rept. 12. 55 p.